

What is claimed is:

1. A substrate assembly for supporting an optical component having at least one of an optical transmission function, a light condensing function and  
5 a light reflecting function, comprising:  
a substrate having a front surface and a first recess having an open end at least at the front surface;  
a second recess formed portion disposed in the  
10 first recess and having a second recess smaller in diameter than the first recess and having an open end at least at a side corresponding to the front surface, the second recess formed portion being made of a material having a machinability better than a material  
15 forming the substrate; and  
an alignment guide member fitted in the second recess and having a protruded portion protruding from the front surface of the substrate and fittingly engageable in an alignment hole of the optical  
20 component.
2. A substrate assembly according to claim 1, wherein the second recess is a high-precision machined hole, and the alignment guide member comprises a guide  
25 pin fitted in the high-precision machined hole.
3. A substrate assembly according to claim 2, wherein the substrate is made of a ceramic material, and the second recess formed portion is made of an  
30 inorganic material having a machinability better than the ceramic material.

4. A substrate assembly according to claim 1,  
wherein the substrate comprises at the front surface  
thereof a positioning reference portion that serves as  
a reference for positioning of an optical component  
5 and for forming the second recess.

5. A substrate assembly according to claim 1,  
wherein the second recess serves as a reference for  
positioning of an optical device.  
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6. A substrate assembly according to claim 1,  
wherein the substrate comprises two first recesses  
each having the second recess formed portion formed  
with the second recess and a positioning reference  
15 portion disposed between the second recesses so as to  
serve as a reference for positioning of the second  
recesses.

7. A fabrication method of a substrate assembly for  
20 supporting an optical component having at least one of  
an optical transmission function, a light condensing  
function and a light reflecting function, the  
substrate assembly including a substrate having a  
front surface and a first recess having an open end at  
25 least at the front surface, a second recess formed  
portion disposed in the first recess and having a  
second recess smaller in diameter than the first  
recess and having an open end at least at a side  
corresponding to the front surface, the second recess  
30 formed portion being made of a material having a  
machinability better than a material forming the  
substrate, and an alignment guide member fitted in the  
second recess and having a protruded portion

protruding from the front surface of the substrate and fittingly engageable in an alignment hole of the optical component, the method comprising:

5 a first perforating step of forming the first recess in the substrate by machining;

a second recess formed portion forming step of forming the second recess formed portion in the first recess;

10 a second perforating step of forming the second recess in the second recess formed portion by machining after the second recess formed portion forming step; and

a guide member fitting step of fitting the alignment guide member in the second recess.

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8. A fabrication method according to claim 7, wherein the second perforating step comprises forming the second recess by high-precision machining.

20 9. A fabrication method of a substrate assembly for supporting an optical component having at least one of an optical transmission function, a light condensing function and a light reflecting function, the substrate assembly including a ceramic substrate  
25 having a front surface and a first recess having an open end at least at the front surface, a second recess formed portion placed in the first recess and having a second recess smaller in diameter than the first recess and having an open end at least at the  
30 front surface, the second recess formed portion being made of a ceramic material having a machinability better than an inorganic material forming the substrate, and an alignment guide member fitted in the

second recess and having a protruded portion protruding from the front surface of the ceramic substrate and fittingly engageable in an alignment hole of the optical component, the method comprising:

5       a first perforating step of forming the first recess in an unsintered ceramic product by machining;

          a firing step of firing the unsintered ceramic product to form the ceramic substrate;

10       a second recess formed portion forming step of forming the second recess formed portion in the first recess;

15       a second perforating step of forming the second recess in the second recess formed portion by machining after the second recess formed portion forming step; and

          a guide member fitting step of fitting the alignment guide member in the second recess.

10.       A fabrication method according to claim 9,  
20       wherein the first perforating step and the second perforating step comprise forming the first recess and the second recess so that the inner diameter of the first recess after the firing step is larger than the inner diameter of the second recess and the outer  
25       diameter of the alignment guide member.

11.       A fabrication method according to claim 9,  
          wherein the second perforating step comprises forming the second recess by high-precision machining.

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12.       A fabrication method of a substrate assembly for supporting an optical component having at least one of an optical transmission function, a light condensing

function and a light reflecting function, the substrate assembly including a substrate having a front surface and a first recess having an open end at least at the front surface, a second recess formed  
5 portion disposed in the first recess and having a second recess smaller in diameter than the first recess and having an open end at least at the front surface, the second recess formed portion being made of a material having a machinability better than a  
10 material forming the substrate, and an alignment guide member fitted in the second recess and having a protruded portion protruding from the front surface of the substrate and fittingly engageable in an alignment hole of the optical component, the method comprising:

15 a perforating step of forming the first recess in the substrate by machining; and

a second recess formed portion forming and a guide member mounting step of holding the alignment guide member so that a portion of the alignment guide  
20 member is positioned within the first recess, filling an uncured material in the first recess and curing the material thereby forming the second recess formed portion having the second recess and fittingly mounting the alignment guide member in the second  
25 recess.